

Chemical Mechanical Planarization technology for innovative superconducting devices and detectors for astrophysics instruments

Completed Technology Project (2017 - 2019)



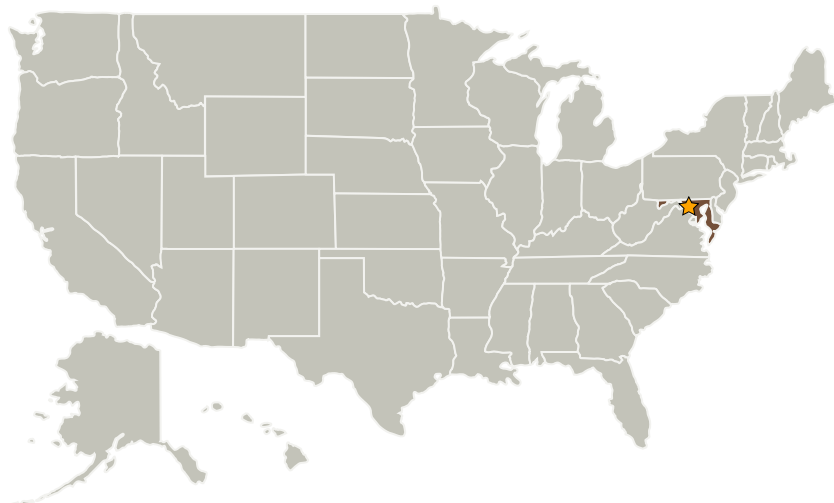
Project Introduction

Chemical Mechanical Planarization (CMP) is a technique that, among multiple benefits, provides self-alignment that enables the smaller critical feature size critical to the performance of many superconducting devices. This effort builds on an FY18 CIF, in which they leveraged local facilities (at GSFC and NIST, Gaithersburg) to develop CMP recipes for the NASA-specific, unique materials needed to further expand our ability to apply CMP for breakthrough enhancements in astrophysics instruments. The specific goal for FY19 is to combine FY18 efforts to make a Metallic Magnetic Calorimeter structure with solenoidal geometry for enhanced energy resolution, and to start taking advantage of CMP's ability to make self-aligned structures. This innovation provides opportunities to improve sensitivity and decrease pixel size for x-ray microcalorimeters, simplify wiring, and make new types of superconducting devices or microwave components for multiplexed readout. The technology infusion target will be upcoming APRA proposals.

Anticipated Benefits

In many cases, detector technology developed for astrophysics applications relies on superconducting detectors, amplifiers, and wiring, and yet the fabrication methods employed so far allow for fabrication of only a small subset of useful superconducting devices. Advanced techniques for sensor fabrication, using materials suitable for NASA applications, are needed to improve sensitivity and decrease pixel size.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
National Institute of Standards and Technology(NIST)	Supporting Organization	US Government	Boulder, Colorado

Primary U.S. Work Locations

Maryland

Project Website:

https://www.nasa.gov/directorates/spacetech/innovation_fund/index.html#.VC

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Innovation Fund: GSFC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

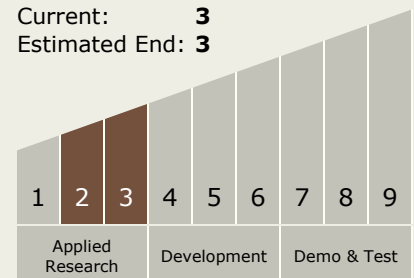
Peter M Hughes

Principal Investigator:

Thomas R Stevenson

Technology Maturity (TRL)

Start: 2
 Current: 3
 Estimated End: 3



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Target Destination

Outside the Solar System